

RF SIGNAL OF KARAOKE DATA RECEIVING PACK AND

KARAOKE SYSTEM USING THEREOF

5

Technical Field

The present invention relates to an RF signal of
karaoke data receiving pack and karaoke sysrem using
thereof. More specifically, the invention relates to an
10 RF signal of karaoke data receiving pack and karaoke
sysrem using thereof, in which an extension pack is
combined with an extension pack slot such that songs
are easily added and a main body has a computing
function and a wired or a wireless serial communication
15 function and is easily connected to an external
computing device so that a user can enjoy Karaoke using
the computing function of the external computing device.

Background Art

20 A Karaoke system known as a popular entertainment
apparatus has been developed into a potable Karaoke
device constructed in such a manner that a microphone
and the main body of the system are integrated into
each other owing to a demand for space saving and a
25 development of semiconductor integrated circuit
technology. The portable Karaoke device has an outer
appearance similar to a microphone and includes a
microphone grill placed on the top of the main body and
various circuit components arranged inside the main
30 body. In addition, numeral keys required for selecting
a song number are located on the front face of the main

body, and an LCD for displaying a selected song number is disposed above the numeral keys. A video signal
5 output from the portable Karaoke device is provided to a video input port of an AV system such as a TV receiver through a cable and an audio signal output from the portable Karaoke device is transmitted to an audio input port of the TV receiver through a wire to
10 be reproduced.

However, the conventional portable Karaoke device is large, heavy and expensive because all of the components are mounted in the main body.

In the meantime, a variety of electronic game
15 devices, which can be easily connected to a TV receiver having a screen larger than that of a computer monitor and audio processing performance superior to that of a computer such that users can enjoy games, are put on the market. Playstation of Sony Co. and X-box of
20 Microsoft are typical game devices. Furthermore, a high-performance CPU, a large-capacity memory and various peripherals as powerful as those of a personal computer are mounted in the game devices because a CPU processing speed and memory capacity are remarkably
25 increased. However, these game devices are used only for games, but not used for other purposes in spite of their high performances.

Moreover, a game program is installed in a personal computer such that a desired game or a desired
30 song can be downloaded to enjoy. However, the lyric of a selected song cannot be displayed using the personal computer.

Disclosure of Invention

5 Accordingly, the present invention has been made
in view of the above problems occurring in the prior
art, and it is an object of the present invention is to
provide an RF signal of karaoke data receiving pack and
karaoke sysrem using thereof, in which an extension
10 pack is combined with an extension pack slot such that
songs are easily added and a main body has a computing
function and a wired or a wireless serial communication
function and is easily connected to an external
computing device so that a user can enjoy Karaoke using
15 the computing function of the external computing device.

To accomplish the above object, according to one
aspect of the present invention, there is provided an
RF Karaoke data receiving pack comprising an RF
receiver for receiving a voice signal and key data
20 signal radio-transmitted from a wireless microphone
device via a receiving antenna; a demodulator for
demodulating the signal applied thereto from the RF
receiver; an audio/key data signal separator for
separating the voice signal and key data signal from
25 the signal demodulated by the demodulator; a waveform
shaping unit for shaving the waveform of the key data
signal; an A/D converter for converting the voice
signal into a digital signal; a receiver MCU connected
to an external computing device having a computing
30 function and a sound processing function, the receiver
MCU controlling the internal operation of the RF
Karaoke data signal receiving pack while transmitting

the digital voice signal and key data signal to the
5 external computing device; a serial communication
interface transmitting the digital voice signal and key
data signal to the external computing device under the
control of the receiver MCU; and an extension pack in
10 which additional songs are recorded, the extension pack
being connected to an extension pack slot to transmit
data of the additional songs under the control of the
receiver MCU.

The serial communication interface may be a USB
interface and the external computing device may be an
15 X-box game device or the main body of a personal
computer.

To accomplish the above object, according to
another aspect of the present invention, there is also
provided a Karaoke system comprising a wireless
20 microphone device for modulating key data signal
generated from various keys including numeral keys used
for selecting a song and accompaniment keys and a
user's voice signal and radio-transmitting the
modulated key data signal and voice signal; an external
25 computing device including a computing function, a
serial communication interface and a sound processing
function, the external computing device being the
subject of the operation of the Karaoke system; an RF
Karaoke system data receiving pack for receiving the
30 voice signal and key data signal from the wireless
microphone device, demodulating the received voice
signal and key data signal and transmitting the

demodulated voice signal and key data signal to the
5 external computing device via the serial communication
interface; an optical disk storing a Karaoke system
operating program executed and read by the external
computing device, song data and background image data;
10 and an audio device connected to the external computing
device through a connector to reproduce an audio signal
provided by the external computing device.

Brief Description of the Drawings

Further objects and advantages of the invention
15 can be more fully understood from the following
detailed description taken in conjunction with the
accompanying drawings, in which:

FIG. 1 illustrates the construction of a Karaoke
system according to an embodiment of the present
20 invention;

FIG. 2 is a block diagram of the wireless
microphone device of the Karaoke system shown in FIG.
1;

FIG. 3 is a block diagram of the serial
25 communication driver used as the RF Karaoke data
receiving pack of the Karaoke system of FIG. 1;

FIG. 4 is a block diagram of the X-box game device
of the Karaoke system of FIG. 1;

FIG. 5 is a flow chart showing the operation of
30 the Karaoke system of the present invention;

FIG. 6a is a perspective view of an extension pack
according to an embodiment of the present invention;

FIG. 6b is a plane view of the extension pack
5 according to an embodiment of the present invention;
and

FIG. 7 illustrates a Karaoke system using a
personal computer instead of the X-box game device
according to another embodiment of the present
10 invention.

Best Mode for Carrying Out the Invention

The present invention will now be described in
detail in connection with preferred embodiments with
15 reference to the accompanying drawings.

FIG. 1 illustrates the construction of a Karaoke
system according to an embodiment of the present
invention. In the construction of the Karaoke system
according to the present invention, a serial
20 communication driver is used as an RF Karaoke data
signal receiving pack and an X-box game device is used
as an external computing device, for example.

The Karaoke system according to the embodiment of
the present invention includes a wireless microphone
25 device 100, a serial communication driver as an RF
Karaoke data receiving pack 200, an X-box game device
as an external computing device that is the subject of
the operation of the Karaoke system, a digital video
disk (DVD) ROM 400, and a TV receiver 500. The wireless
30 microphone device 100 modulates key data signal
generated from various keys including numeral keys used
for selecting a song and accompaniment keys and a

user's voice signal and radio-transmits the modulated
5 data and signal. The serial communication driver as an
RF Karaoke data receiving pack 200 is connected to a
serial communication port of the X-box game device 300,
for example, a joystick input port. The RF Karaoke data
10 receiving pack 200 receives and demodulates the key
data signal and voice signal transmitted from the
wireless microphone device 100 and transmits the
demodulated data and signal to the external computing
device 300. The DVD-ROM 400 includes a Karaoke system
operating program 410 executed and read by the X-box
15 game device 300, a song data storage unit 420 and a
background image data storage unit 430. The TV receiver
500 is connected to the X-box game device 300 via an AV
connector and audio-visually reproduces video and audio
signals transmitted from the X-box game device 300.

20 The wireless microphone device 100 includes a main
body 102 a user can grip, a microphone grill 104
provided on the top of the main body 102, and a key pad
106 placed at the middle part of the main body 102.

The X-box game device 300, which is a next-
25 generation video game device of Microsoft Co. includes
Intel pentium III 733MHz CPU, a large-capacity hard
disk drive having capacity of more than 8GB, a 64MB
main memory, a high-performance graphic processor
(graphic card), four controller ports (joystick input
30 ports), a single AV output port, a single Ethernet port,
5X DVD-ROM drive, 256 audio channels, 64 3D audio
channels, and an audio digital-analog converter. The X-

box game device 300 is supported by MIDI (musical
5 instrument digital interface).

The serial communication driver 200 transmits and receives signals in a wireless or wired manner using one of a USB (universal serial bus) drive, an FM transceiver, a laser transceiver and an infrared
10 transceiver.

FIG. 2 is a block diagram of the wireless microphone device of the Karaoke system shown in FIG. 1. Referring to FIG. 2, the wireless microphone 100 includes a key input unit 110, a microphone 140, a
15 micro-controller unit 120, an RF modulator 130, and an RF transmitter 150. The key input unit 110 receives commands input by a user through the numeral keys used for selecting a song, the accompaniment key and other function keys. The microphone 140 converts the user's
20 voice into an electric audio signal. The micro-controller unit 120 identifies the commands input to the key input unit 110 and outputs a key data signal corresponding to each command. Hereinafter, the micro-controller unit 120 is called MCU and, when there is a
25 need to distinguish the MCU 120 from an MCU included in the serial communication driver, which will be explained later, the former is called "transmitter MCU" and the latter is called "receiver MCU".

The RF modulator 130 modulates the audio signal
30 transmitted from the microphone 140 and the key data signal sent from the transmitter MCU 120 into predetermined RF frequency signals. The RF transmitter

150 transmits the key data signal and audio signal
5 modulated by the RF modulator 130 via a transmission
antenna 160. The wireless microphone device can further
include an LCD panel used for the user to confirm a
selected song number under the control of the
transmitter MCU 120.

10 FIG. 3 is a block diagram of the serial
communication driver used as the RF Karaoke data
receiving pack of the Karaoke system of FIG. 1.
Referring to FIG. 3, the serial communication driver
includes an RF receiver 220, a demodulator 230, an
15 audio/key data signal separator 240, a waveform shaping
unit 250, an A/D converter 260, a micro-controller unit
(receiver MCU) 270, a serial communication interface
280, and an extension pack 280.

The RF receiver 220 receives a signal radio-
20 transmitted from the wireless microphone device 100 via
a receiving antenna 210. The demodulator 230
demodulates the signal applied thereto from by the RF
receiver 220. The audio/key data signal separator 240
separates an audio signal and key data signal from the
25 signal demodulated by the demodulator 230. The waveform
shaping unit 250 shapes the waveform of the key data
signal. The A/D converter 260 converts the analog audio
signal into digital signal. The receiver MCU unit 270
is connected to the external computing device (X-box
30 game device in this embodiment) having a computing
function, a serial communication interface and a sound
processing function to control the internal operation

of the serial communication driver while transmitting
5 the digital audio signal and key data signal to the
external computing device. The serial communication
interface 290 transmits the digital audio signal and
key data signal to the external computing device under
the control of the receiver MCU 170. The extension pack
10 280 for storing additional songs is combined with an
extension pack slot 281 to transmit data of the
additional songs under the control of the receiver MCU
270. Newly added song data is stored in the extension
pack 280 such that the user can easily enjoy newly
15 added songs at a low cost.

FIG. 4 is a block diagram of the X-box game device
of the Karaoke system of FIG. 1. Referring to FIG. 4,
the X-box game device includes a CPU 310 for
controlling components of the game device according to
20 an operating system installed therein, a DVD-ROM driver
320 for reading information stored in the DVD-ROM 400
under the control of the CPU 310, a sound source module
342 for supporting an internal MIDI interface, a sound
card 340 having a mixer 344 for mixing a wave MIDI with
25 sounds input through various channels, a graphic card
350 for processing images related with games, four
controller ports and a hard disk (not shown)
constructing a USB interface 330.

The DVD-ROM 400 includes the Karaoke system
30 operating program 410, song data storage unit 420 for
storing song data and background image data storage
unit 430 for storing video data constructing background

images. The song data storage unit 420 stores MIDI data
5 that is melody data and lyric data synchronized with
the MIDI data.

The Karaoke system operating program 410 includes
an audio/key data separating unit 411, a key data
processing unit 412, a sound processing unit 413, a
10 caption processing unit 414, a background image
processing unit 415, an audio output unit 416, a video
output unit 417 and an other function processing unit
418. The audio/key data separating unit 411 separates a
digital audio signal and key data signal input through
15 the USB interface 330 from each other. The key data
processing unit 412 identifies the contents and kind of
the separated key data. The sound processing unit 413
reads song data of a corresponding song, stored in the
song data storage unit 420, separates MIDI data from
20 the song data to provide the MIDI data to the sound
source module 342 and provides the digital audio signal
separated by the audio/key data separating unit 411 to
the mixer 344. The caption processing unit 414 reads
the song data and separates lyric data from the song
25 data. The background image processing unit 415 reads
background image data stored in the background image
data storage unit 430 and superimposes the lyric
separated by the caption processing unit 414 on the
background image corresponding to the background image
30 data. The audio output unit 416 outputs an audio signal,
that is, a mixed signal of a voice signal and a melody
processed by the sound source module 342 to an audio

port of the TV receiver. The video output unit 417
5 outputs the background image and lyric processed by the
background image processing unit 415 to a video port of
the TV receiver. The other function processing unit 418
processes many functions including a recording function
and a function of generating various sound effects such
10 as echo and chorus.

Preferably, the Karaoke system operating program
included in the DVD-ROM 400 is automatically installed
in a hard disk when executed by the X-box game device
300. In addition, song data and background image data
15 can be transferred to the hard disk.

FIG. 5 is a flow chart showing the operation of
the Karaoke system of the present invention. Here, the
CPU 310 of the X-box game device 300 executes the
operation of the Karaoke system in cooperation with the
20 Karaoke system operating program 410 included in the
DVD-ROM.

Referring to FIG. 5, the serial communication
driver 200 is connected to a controller port of the X-
box game device 300 and the X-box game device 300 is
25 powered on in the step S10. When the DVD-ROM 400 is
loaded into a DVD tray (not shown), the CPU 310 outputs
video data corresponding to a background image to the
TV receiver 500 and waits for input of key data signal
in the step S12. Then, the CPU 310 judges whether key
30 data signal is input in the step S14. When the key data
signal is input, the CPU 310 judges whether the input
key data signal is key data signal about a song number

in the step S16. When the input key data is the key
5 data about a song number, the CPU 310 stores the song
number in the step S18 and the routine is returned to
the step S12. When the input key data is not the key
data about a song number, the CPU 310 judges whether
the input key data is accompaniment key data in the
10 step S20.

When the input key data is the accompaniment key
data, the CPU judges whether there is a stored song
number in the step S22. When there is the stored song
number, the CPU separates MIDI data from corresponding
15 song data and outputs the MIDI data to the sound source
module 342 in the step S26 and separates caption data
from the song data and outputs the caption data in the
step S28. When there is no stored song number, the CPU
process an error in the step 24 and the routing returns
20 to the step S12.

The CPU judges whether a voice signal is input in
the step S30. When the voice signal is input, the CPU
outputs the voice signal to the mixer 344 in the step
S32. The mixer 344 mixes the voice signal with a melody
25 provided by the sound source module 342 and outputs the
mixed signal to the TV receiver 500 through the audio
port.

Then, the CPU judges whether the accompaniment of
the corresponding song is finished in the step S34. The
30 routine is returned to the step S26 when the
accompaniment is not finished yet but returns to the
step S22 when the accompaniment is finished.

When the input key data is not the accompaniment
5 key data in the step S20, the CPU judges whether a
completion key is input in the step S36. The CPU
processes the function of the key data in the step S40
when the completion key is not input, and components of
the X-box game device 300 are requested to be finished
10 in the S38 when the completion key is input.

FIGS. 6a and 6b illustrate the extension pack
according to an embodiment of the present invention.
FIG. 6a is a perspective view of the extension pack and
FIG. 6b is a plane view of the extension pack.

15 The extension pack includes a housing 282 forming
the body of the extension pack, an antenna wire 283, an
RF signal receiving pack 284, a male connector 285 for
a receiving module, and a plurality of storage packs
286. The antenna wire 283 is fixed inside the housing
20 along the edge of the housing and captures an RF signal
to transmit the RF signal. The RF signal receiving pack
284 demodulates the RF signal transmitted from the
wireless microphone and captured by the antenna wire
283 and separates a song data signal from the RF signal.
25 The male connector 285 is electrically connected to an
output signal line of the RF signal receiving pack 284
and protruded from one side of the housing 282 such
that the male connector is connected to the extension
slot 281 under the control of the receiver MCU 270. The
30 plurality of storage packs 286 are fitted in the
housing 282 and store data about new songs.

While the antenna wire 283 can be formed in a 'U'

shape, the shape of the antenna wire is not limited
5 thereto. The antenna wire 283 can be formed at a proper
position inside the housing 282 in a predetermined
length.

FIG. 7 illustrates a Karaoke system using a
personal computer instead of the X-box game device
10 according to another embodiment of the present
invention. Referring to FIG. 7, the Karaoke system
includes a wireless microphone device 100, a serial
communication driver 200, and a personal computer 600.
The wireless microphone device 100 modulates key data
15 signal generated from various keys including numeral
keys used for selecting a song and accompaniment keys
and a user's voice signal and radio-transmits the
modulated data and signal. The serial communication
driver 200 is connected to a serial communication port
20 of the personal computer 600, receives the key data
signal and voice signal from the wireless microphone
device 100, demodulates the key data signal and voice
signal and transmits the demodulated signals to the
personal computer 600.

25 The personal computer 600 is the subject of the
operation of the Karaoke system. The personal computer
600 includes a lyric data storage unit 610 in which a
Karaoke system operating program is installed, a
background image data storage unit 620, a sound source
30 module 630, a sound processor 640, and a caption
processor 650. The lyric data storage unit 610 stores
lyric data, and the background image data storage unit

620 stores video data corresponding to backgrounds. The
5 sound processor 640 reads song data about a song stored
in the lyric data storage unit 610 and separates MIDI
data from the song data to provide the MIDI data to the
sound source module 630. The caption processor 650
reads lyric data about a corresponding song from the
10 lyric data storage unit 610 and separates caption data
from the lyric data.

For example, a computer including a sound card, a
USB port and a speaker can be used as the external
computing device. Furthermore, game devices having
15 functions similar to that of the X-box game device can
be used as the external computing device. When the
computer is used as the external computing device, a
compact disk can replace the DVD. Moreover, IEEE 1394
device, which has a serial communication interface with
20 high operating speed and does not require a host
controller, can replace the serial communication driver.

While the present invention has been described
with reference to the particular illustrative
embodiments, it is not to be restricted by the
25 embodiments but only by the appended claims. It is to
be appreciated that those skilled in the art can change
or modify the embodiments without departing from the
scope and spirit of the present invention.

30 **Industrial Applicability**

According to the present invention, only the
wireless microphone device, RF Karaoke data receiving

pack and DVD are needed to construct an inexpensive
5 Karaoke system because an external computing device a
user owns can be used. Thus, the external computing
device of the user can be utilized for various purposes.
Furthermore, the present invention can provide a
compact portable Karaoke system such that the user can
10 easily carry the Karaoke system when moved.